

CLIMATOLOGICAL DATA FOR JULY, 1912.

DISTRICT No. 6, MISSOURI VALLEY.

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GENERAL SUMMARY.

In the southeastern part of the district, or in the territory below a line drawn northeast and southwest through Sioux City, Iowa, comparatively warm and dry weather prevailed, but crops suffered very little on account of the lack of the seasonal amount of rain, for the showers that occurred were distributed uniformly through the month. To the northwest of this line the temperatures were lower and the precipitation heavier. In Montana the mean temperature for the month was the lowest July average in the last 18 years, and several stations in Montana, Wyoming, Colorado, and North Dakota had temperatures below the freezing point. Both the Dakotas had frost on the 15th. In North Dakota it was heavy and caused considerable damage to crops and garden vegetables, especially in the Missouri Valley; in South Dakota it was light and no extensive damage resulted. A noteworthy feature of the month was the large number of heavy local storms; even in the sections over which the precipitation was as a rule deficient there were some places of very small extent where excessive rains occurred. On the morning of the 14th there was a thunderstorm over the mouth of the Missouri River that gave 3.15 inches of rain in St. Louis in two hours; 2.95 inches of this amount fell in one hour, and it was the heaviest fall in that length of time ever recorded in St. Louis. This storm was phenomenally heavy in Alton, Ill., a description of which appears under District No. 5. In Iowa a miniature tornado is reported to have passed 4 miles north of Little Sioux, Harrison County, on the 9th, moving from the southwest; it blew a barn over and moved a dwelling and a schoolhouse from their foundations; beyond this there was little damage. In Kansas a hailstorm occurred on the afternoon of the 11th at the headwaters of Grasshopper Creek, in the northeastern part of the State; it covered a strip of country 10 miles long and 6 miles wide, in which all kinds of crops were damaged or destroyed; window glass was broken and chickens and small pigs were killed by the hailstones, some of which were nearly as large as hens' eggs. At Grant, Perkins County, southwestern Nebraska, a 24-hour rain of 4.83 inches fell on the 25th. There was some local damage by hail in South Dakota. Numerous heavy local rains occurred in the eastern portion of Montana; near Bainville, Valley County, one of them was especially heavy and resulted in the sudden filling of a small and normally dry valley to a depth of 10 feet or more, and to a width of a fourth of a mile. Buildings and crops of several homesteaders were damaged or destroyed. Heavy showers were also frequent in Wyoming and washed out some roads, bridges, and crops. Hailstorms occurred often; crops suffered from them, and it is reported that in one of them a child was killed in the northern part of the State. On the 14th an excessive rain in the Cherry Creek Basin, Colo., caused an overflow throughout the greater part of the course of the creek; much damage resulted to both public and private property.

TEMPERATURE.

In the region comprising eastern Nebraska, southwestern Iowa, most of Kansas and Missouri, the mean temperatures for the month were 1° to 3° above the normal. There were no prolonged periods of excessive heat, but there was a seasonable number of hot days well distributed through the month. In the Mountain States, the Dakotas, and western Nebraska, there were several days that were hot, but generally the temperatures were lower than they are in the average July, and the month may be placed in the list of unusually cool ones. Two waves of high atmospheric pressure moved across the district between the 14th and the 19th, and gave the coolest weather of the month, except in the Mountain States, where there was no well-defined period of low temperatures. In the lower part of the district the 14th was quite warm, and cool weather immediately following it gave marked temperature ranges, amounting to as much as 50° in 24 hours in a few localities.

PRECIPITATION.

Over a narrow strip of country at the mouth of the Missouri River the excessive rain of the 14th raised the total precipitation for the month considerably above the July normal. At a few places on the upper Gasconade watershed, and in some of the territory drained by the streams entering the Osage River from the south, there was an excess in precipitation. In the remainder of Missouri, Western Iowa, eastern Nebraska, and eastern Kansas there was a marked deficiency. To the north and west of these sections the rains were heavier than they usually are in July. The region having the greatest monthly total comprised the Dakotas, eastern Montana, and northeastern Wyoming. In every part of the district the distribution of the rainfall through the month was quite uniform.

RIVERS.

In the larger streams the stages were somewhat below the July average. Some of the creeks and small rivers of the mountain and foothill country were in flood locally on account of heavy rains. The Mississippi at St. Louis rose slightly more than a foot and a half within six hours after the excessive rain at the mouth of the Missouri on the 14th. In a day the river was again at its former stage.

FLOOD IN CHERRY CREEK BASIN, COLORADO, JULY 14, 1912.

(By P. McDonough, Local Forecaster, United States Weather Bureau.)

During Sunday afternoon and evening, July 14, 1912, torrential rains occurred over the greater portion of the Cherry Creek drainage basin, especially between Castle Rock and Denver. This stream is an unimportant tributary of the South Platte River, and forms a junction with that river about 200 yards above the Sixteenth

Street viaduct in Denver. It has its source about 50 miles to the south of Denver, and its course to the South Platte lies through the heart of Denver. Its ordinary flow is insignificant, and this is true of the volume of water carried by it during most of Sunday. Between 3.25 p. m. and 6.30 p. m., 2 inches of rain fell in Denver. Of that amount 1.72 inches fell in a period of 30 minutes. At Castle Rock the rain began at 5.15 p. m. For a period of 25 minutes it was very heavy, and by 7 p. m. 1 inch had fallen. It continued after 7 p. m. in the form of a drizzle, and by the morning of the 15th an additional 0.65 inch had occurred. In the southern portion of Denver and in that part of the drainage area lying to the north of Castle Rock the rainfall was apparently considerably greater than at the Weather Bureau station. Aside from flooding streets, the rainfall in Denver proper did not contribute materially to the flood that later in the night inundated the low-lying districts of the city. However, it caused a rise of about 2 feet in the South Platte between 3.30 p. m. and 4.30 p. m.

Up to 8 p. m. there was but little increase in the flow in Cherry Creek, and no evidence of flood conditions were observed in that stream in the vicinity of Denver, but between 8.30 p. m. and 9.30 p. m. the water came down the creek with a rush. By 9.45 p. m. the stream was bankfull, and by 10 p. m. the water overflowed the banks

and spread out two blocks on each side of the creek, north of Welton Street. In the vicinity of the railroad yards and Union Depot the area flooded was much greater. At 10.45 p. m. the water was about 2 feet above the floors of the bridges that cross the stream in the downtown districts, and in the vicinity of the Union Depot it was from 2 to 3 feet deep.

The maximum height attained was about 11 feet, and the maximum flow about 11,000 second-feet. After 10.30 p. m. the flood subsided rapidly. At 11 p. m. the water was well within the banks of Cherry Creek. At midnight the stream had fallen decidedly, and by the early morning of the 15th only the ordinary flow remained. Sand and silt were deposited to a depth of several inches in all localities that were flooded. Much damage resulted to crops, gardens, parks, streets, bridges, buildings, and to merchandise stored in the basements of buildings in the wholesale district. Traffic was interrupted on railroads, and the city tramway service was suspended for several hours. The Denver Gas & Electric Co., suffered material damage, and the Mountain States Telephone & Telegraph Co., had many of its lines put out of commission. In the aggregate, the damage to property was considerable, and is variously estimated at from \$500,000 to \$1,000,000. Two lives were lost and several persons were injured.